Mission Planning Overview


Mission Planning SEIC Industry Day

16 Dec 02

Overview

- **Mission Planning Process**
- **Why Automated Mission Planning?**
- **Mission Planning Functionality**
- **Current Products**
- **Roadmap**
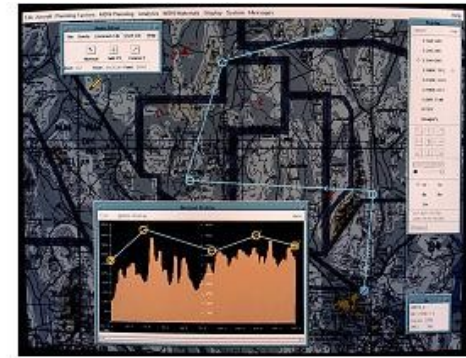- **Current Community**

Mission Planning

- Fuses intelligence, weather, weapon, route, and threat data
- Produces charts, forms, imagery, and loads mission to aircraft
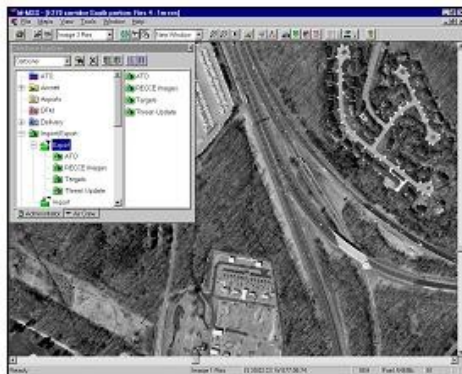- Improves sortie rates, weapons delivery, and unit collaboration
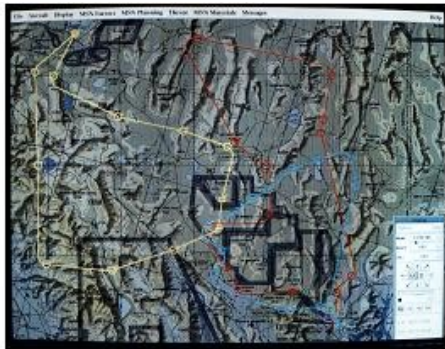
Route Planning
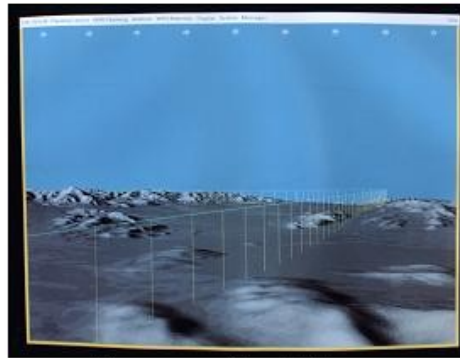
Perspective Views

Vertical Profile

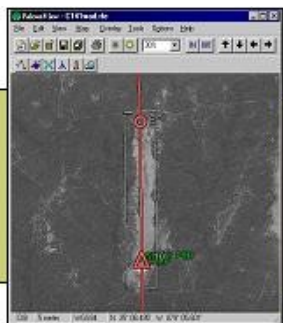**Import/Export from Other Systems**

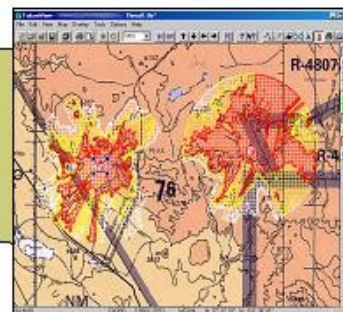**Charts, Maps, and Cartridges**

Route Fly Through

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Mission Planning Process

Perform target area planning

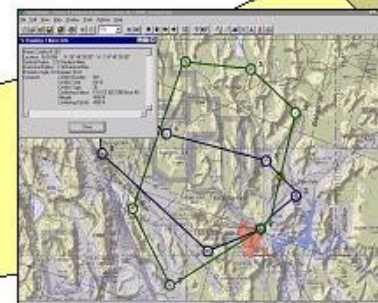**Perform Weaponeering**

Perform Threat Assessment

Perform Route Planning

Support Post Mission Analysis

Prepare Mission Materials

Provide Mission Visualization/Rehearsal

Optimize Survivable Route "Autorouting"

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Inputs to Generating a Mission Plan

Target - Hangar (FMP) - Desired effect (0.5 Pd)

| FUH | FHP | FHA | FMP | FMA | FSP | FSA | RSA | RMA | RHA | MSP | MSA | MMA | MHP | MMP |

Platform Capabilities
- F/A-18
- B-2 / B-1
- JSF
- F-16

Platform Capabilities

Target

Target Effects

Weapon Capability

Onboard Sensor Capabilities

Weapon Availability

Off-board Sensor Capabilities

Weapon Capabilities
- Mk 80 series GP bombs
- AGM-65E
- GBU-10/12/16
- GBU-24
- SLAM-ER
- JDAM
- JDAM PIP
- AGM-154 A/B/C
- HARM

Threat

Environment

ROE

Sensor Capabilities
- Radar / AESA
- FLIR
- EO
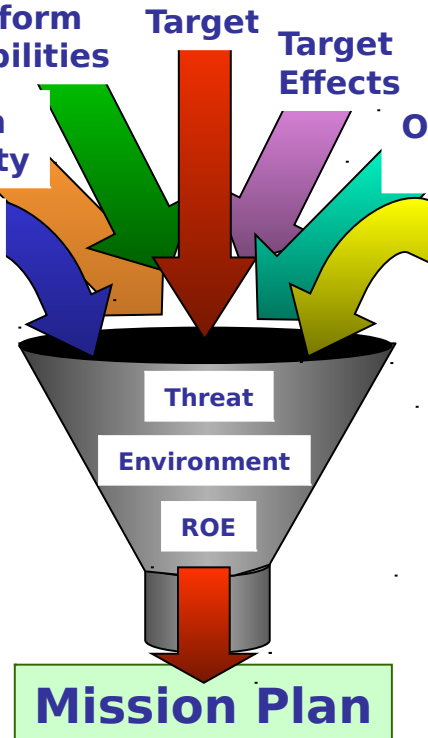
Mission Plan

Mission Planner acts as the funnel through which all inputs are filtered before the desired plan is generated

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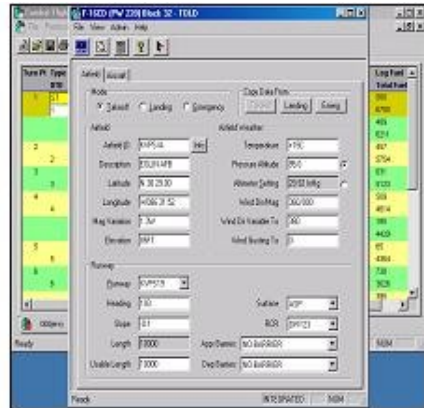
Takeoff & Landing Data
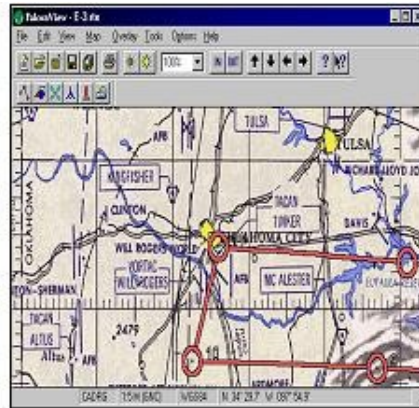
Mapping Software
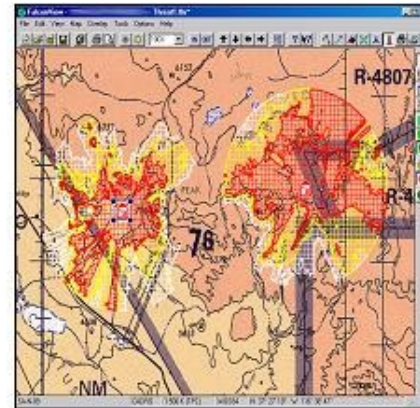
Threat Analysis
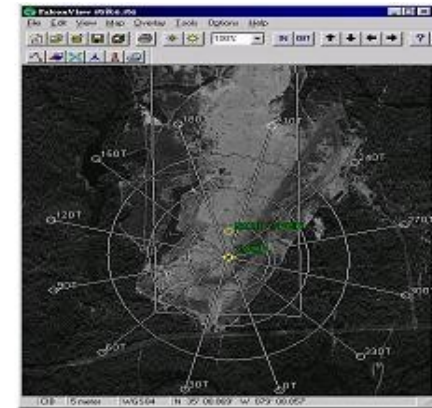
Airdrop Planning
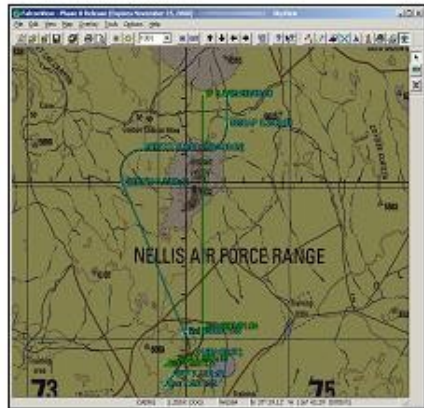
Formation Planning

Close Air Support
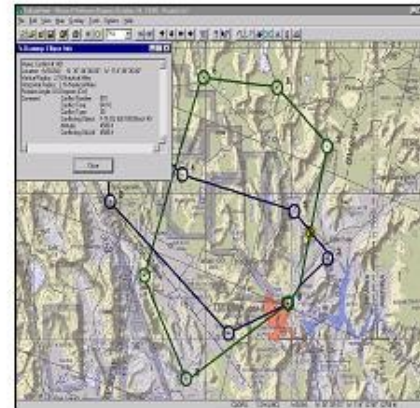
Route Deconfliction
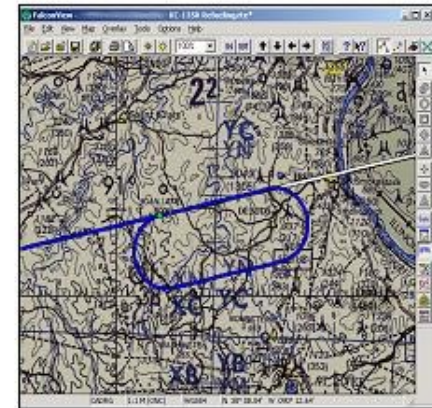
Aerial Refueling

t_0 t_1 t_2 t_3 t_4

DETECT	DECIDE	ENGAGE	ASSESS

ASSESS   DETECT   ENGAGE   DECIDE

COMMANDER'S OBJECTIVES & GUIDANCE

COMBAT ASSESSMENT

TARGET DEVELOPMENT

EXECUTION PLANNING & FORCE EXECUTION

WEAPONEERING ASSESSMENT

FORCE APPLICATION
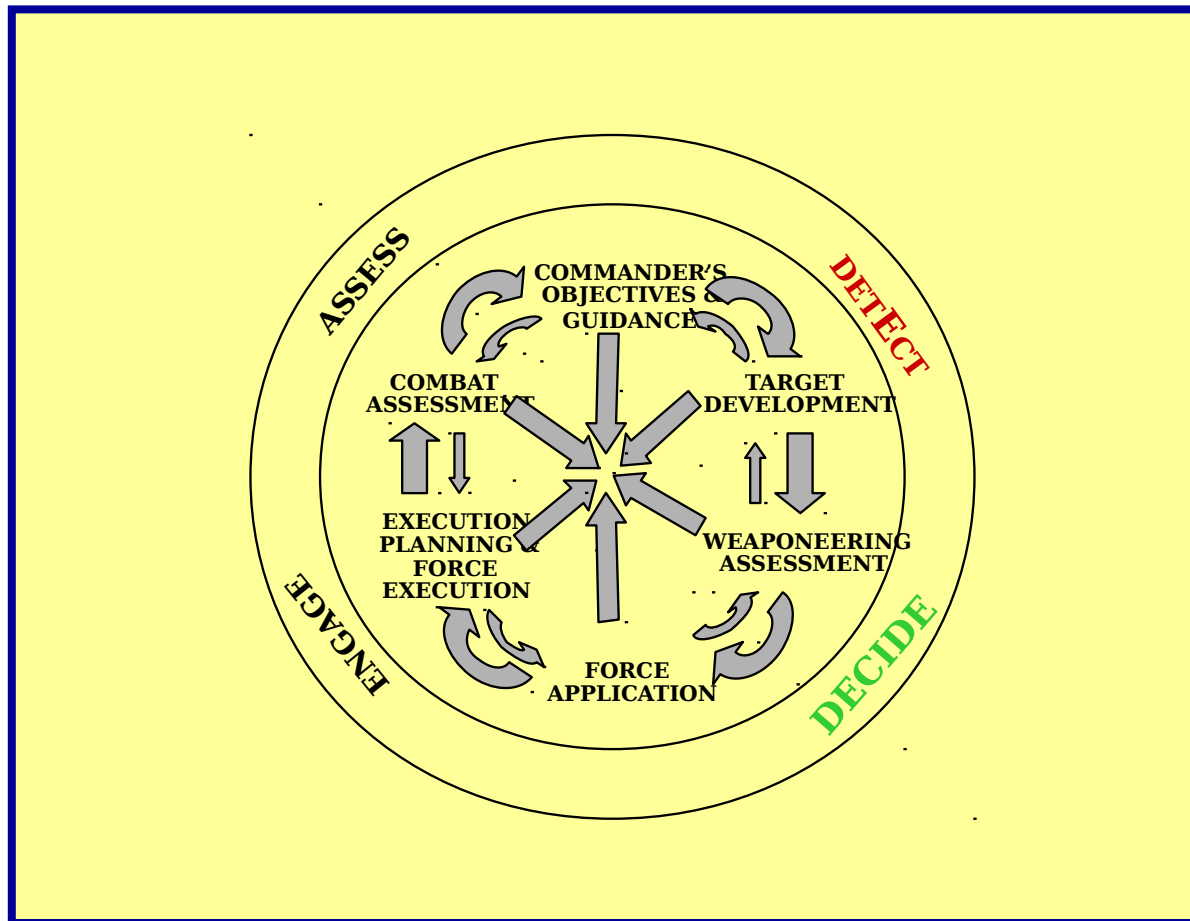
Increased Speed of Decision

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Mission planning got one aircraft to a point for the pilot to visually acquire the target and maneuver the aircraft into a weapon delivery position

Multiple aircraft   Multiple weapons   One Target

Multiple aircraft   Multiple weapons
One Target

• Accuracy and lethality dependent on range to target and resultant CEP

Example - Gravity bombs
100 ft CEP (6 mils @ 16K ft)
Weapons / Sorties : 15 /
3-4 Weather dependent
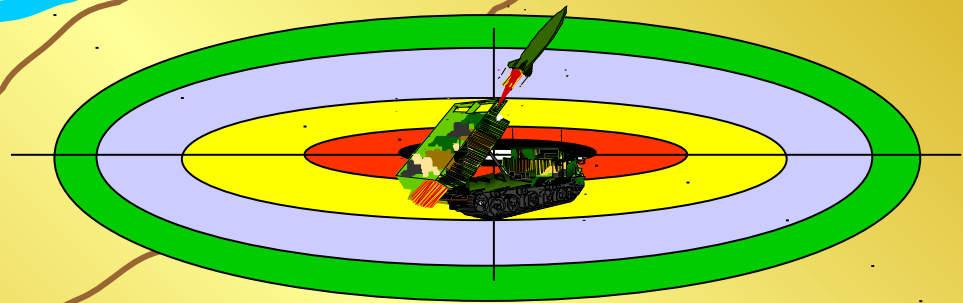
Today with GPS…

Mission planning gets one aircraft to an area outside most target defensives for delivery of multiple weapons to multiple targets simultaneously

One aircraft   Multiple targets   One weapon each

• Accuracy and lethality no longer dependent on range…"Guide to coordinate" weapons changes basic mission planning considerations

Example - JDAM PIP
3m (10 ft) CEP
#Weapons / Sorties : 1 / 1
All wx, launch and leave from standoff

Targeting is increasing the strain on mission planning systems

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Why Automated Mission Planning?
Mission Planning Evolution

- It used to be enough for an aircrew to have:

  Route   Heading   Time   Fuel calculations

- Then, aircrews wanted:

  Threat display   Weaponeering data   Stores planning

  Delivery parameters   Data loads   Masked routing   Weather

- As standoff range and guide to coordinate GPS weapons have increased, aircrews need:

  Sensor prediction   Image reception   LAR manipulation

  Weapon trajectory/obstruction clearance   Mid-course & terminal update

  Target Location Error (TLE)   GPS error   Waypoint Navigation

  Release parameters

- Accomplished via combination aircraft / weapon / sensor integrated upgrades, but the linkage among these is a …

Mission Planning system that maximizes
Weapon System's inherent operational flexibility

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Mission Planning in the C2 Realm

TBMCS Force Level

Air Force Weather Weapons System

Wx Impacts

Intel Reports
Imagery
Order of Battle

ATO

National Intel

ATO/ACO

ATO/ACO

Threat OB
Targets
COP

TBMCS UL-Ops

Execution status

MISREPs

TBMCS UL-Intel

Intel Reports
Imagery
Order of Battle

Winds Aloft

Schedule

DMPI mensuration & validation

Terminal Area Wx

IMOM

Weather Briefings

ATO/ACO

MPS & PFPS

Threat OB Targets & DMPIs

RainDrop

DMPI s

Mission materials

Battlefield Information Exchange

COMMAND & CONTROL

MANEUVER BRIGADE

AVTOC

IMETS

CSSCS

AMPS LNO

ASAS

AFATDS MCS

FAADC2

AMPS LNO

Tactical Internet

SITUATION AWARENESS
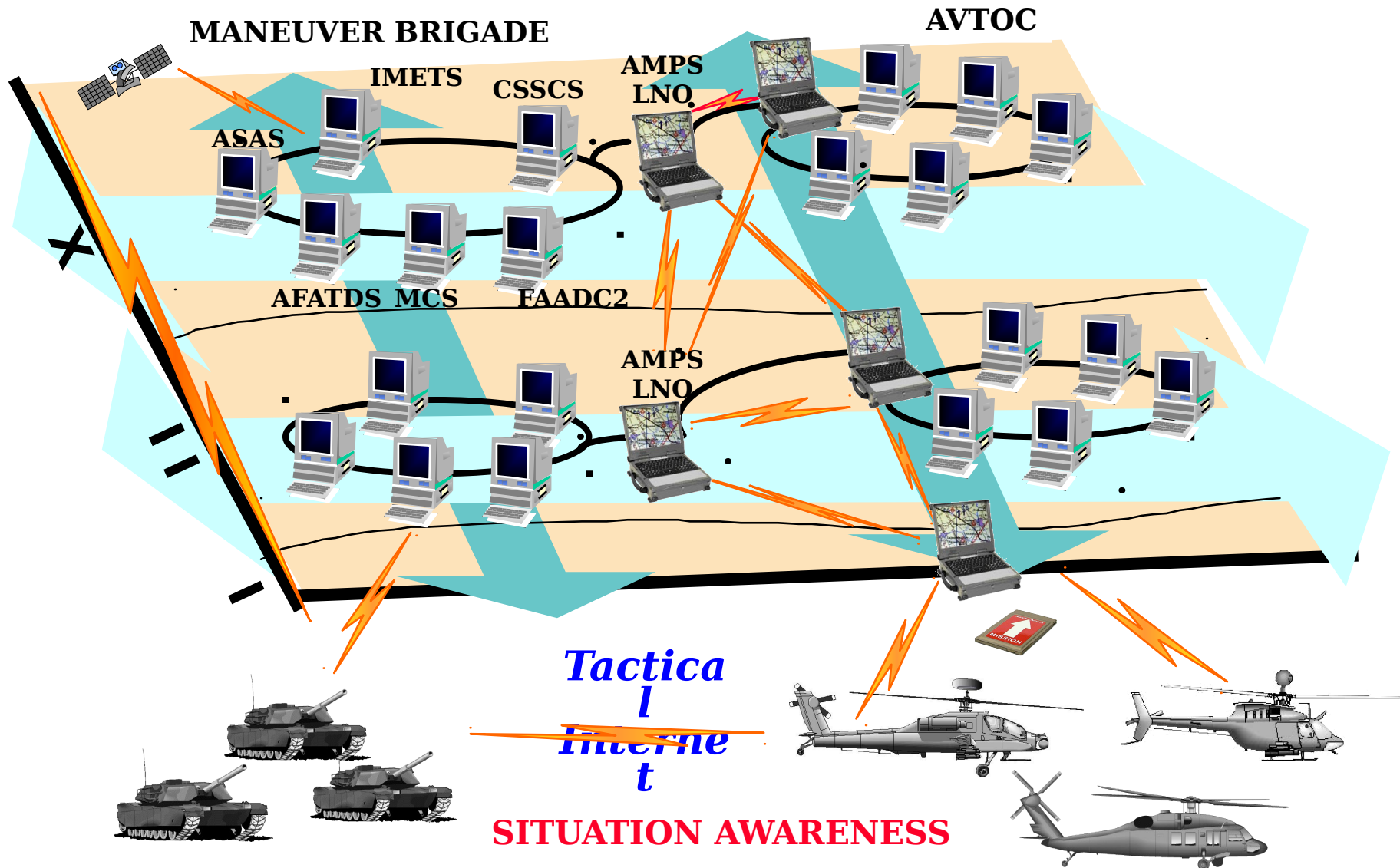
Mission Planning Environment

Mission Planning Environment (MPE)

ATO/ACO
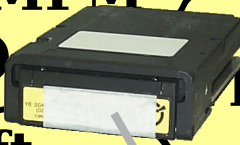
Weather

Intel

Weapon
A/W/E or MPM
(UPC)

Aircraft
A/W/E or MPM
(UPC)

Flight Performance
Modules (FPMs)

Installable Software
Modules (ISMs)

Operational
Flight Program
(OFP)

Collaborative Co-evolution

Acquisition PEOs/ESC /SYSCOMs

Requirements

Field/Fleet Users: Sqdns/Wings/CARGRU, CAG, Wepns Schools, OAG

Co-evolved

Systems

CONOPS

Operational Architecture

Specific tasks and Missions

Effective

Mission Capability Packages
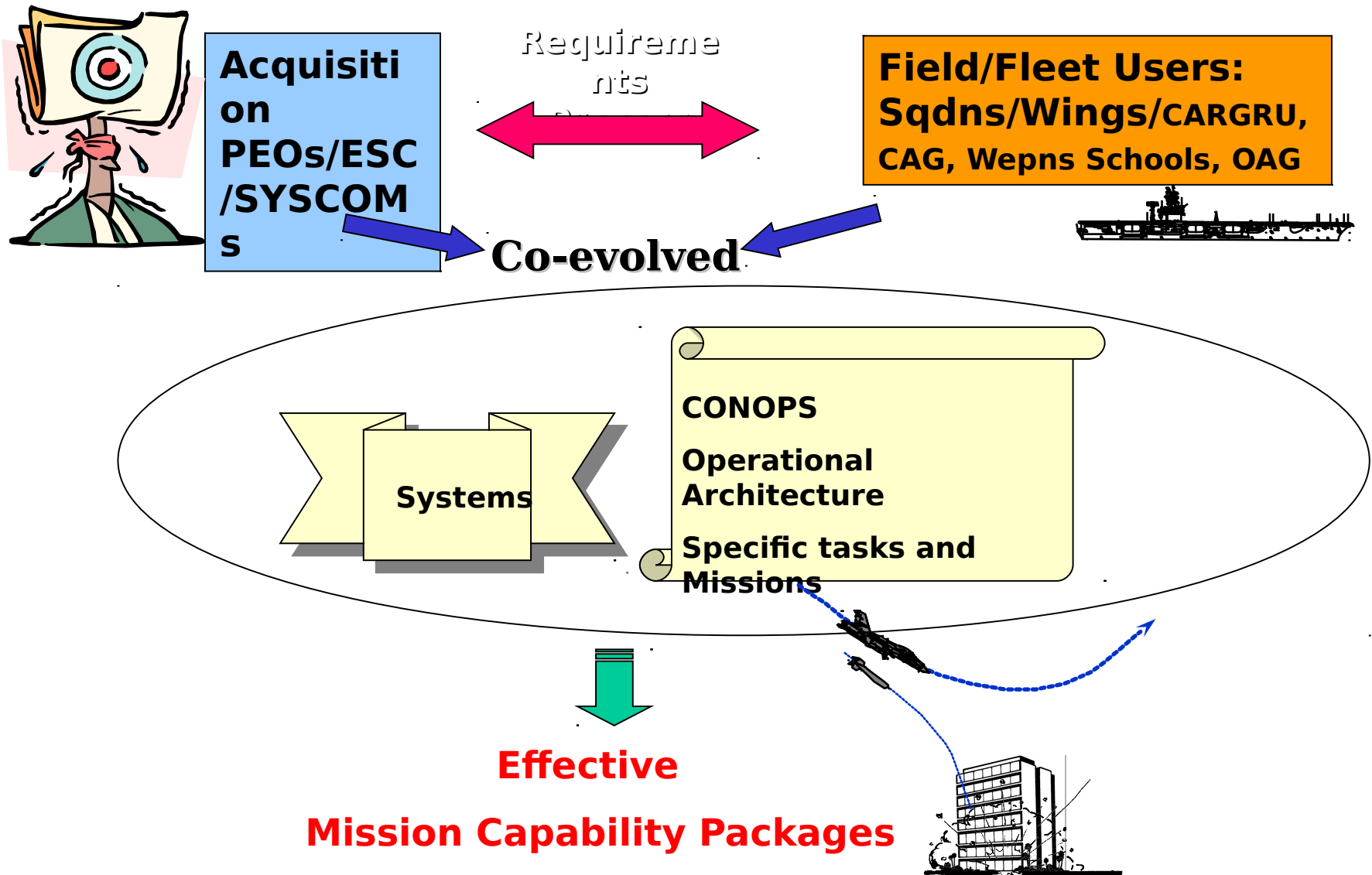
Mission Planning Product Line

Mission Planning System (MPS)
- Robust Unix-based system for PGM and Low Observal
- Developed by Sanders in 1991
- Used by Bombers, Fighters w/PGMs, Recce

Tactical Automated Mission Planning System (TAM
- Robust Unix-based system
- Precision Guided Munitions (PGMs)
- Used by F-18, E-2, and F-14

Army Mission Planning System (AMPS)

Portable Flight Planning System (PFPS)
- Suite of PC-based software components
- Developed by Tybrin/GTRI in 1995
- Used by Fighters, Transport, and Airlift

Joint Mission Planning System (JMPS)
- Next generation PC-based software
- Developed by NGIT (Tybrin, GTRI, Boeing, BAE)
- All Air Force, Army & Navy platforms migrating from

Technical Roadmap to Future Capabilities

FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY0

DELIBERATE

RESPONSIVE

TIME/MISSION CRITICAL

INFO MANAGEMENT/INFO WARFARE

Legacy Stand Alone Systems

Federated

Integrated

Distributed

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DISTRIBUTED APPLICATIONS

INTEGRATED DATA & APPS

SHARED DATA/NETWORK AWARE

UNIQUE DATA/NO NETWORKING
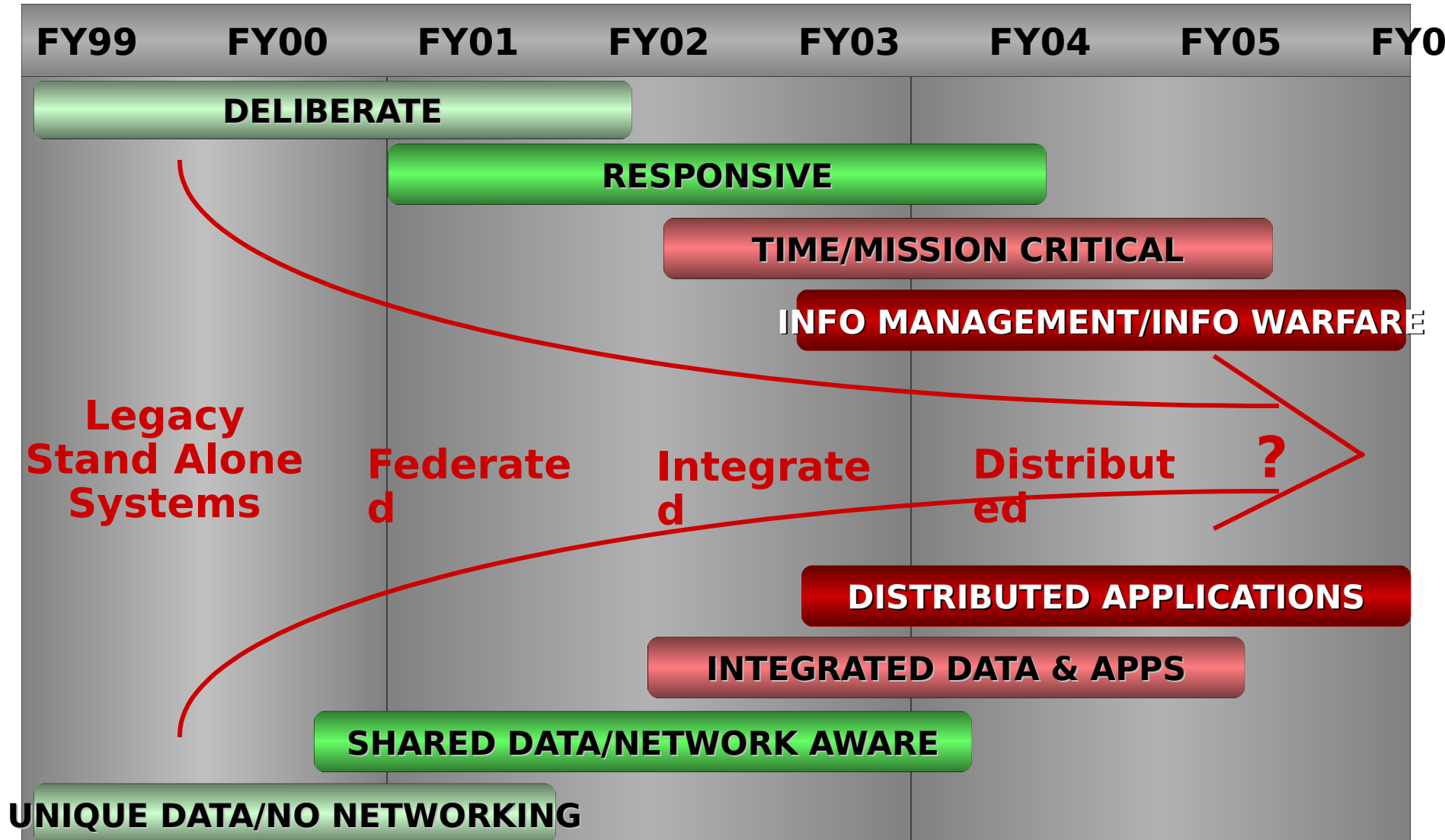
DoD Mission Planning Roadmap

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Navy Fighters Weapons Helos Other	**TAMPS**					TAMPS Off CV						**JMPS**
	N-PFPS 3.2 4.0											**JMPS**
Air Force Fighters Bombers Recce Mobility	**PFPS** 3.2 4.0											**JMPS**
	MPS VVI Sustainment Release											**JMPS**
Army	**AMPS** 3.3 4.0					**PFPS**						**JMPS**
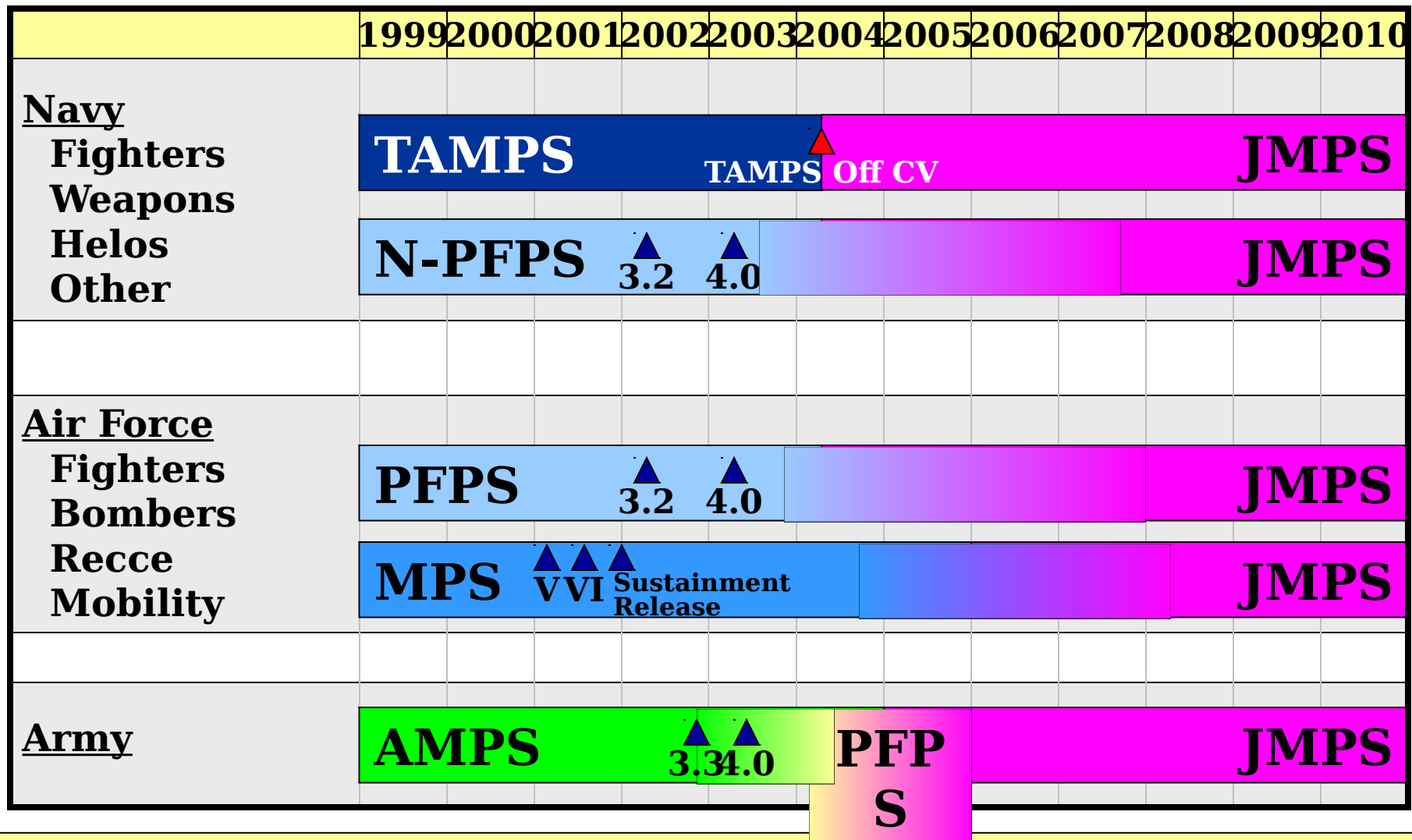
Gov't Mission Planning Community

USAF Aircraft SPOs

AFMSS SPO

Ogden ALC

SPAWAR

PMA-233

NAWC

ACC/DRSM

PEO(AVN)

USSOCOM

46th Test Sqdn   USAF Weapon SPOs

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Mission Planning Developer Community

OO-ALC
F-16 Blk 30 A/W/E
A-10 A/W/E
MPS ISMs

Lockheed Martin
F-117 A/W/E

Boeing
B-2 A/W/E

OC-ALC
B-52 A/W/E

Boeing
F-15 A/W/E
F-15 UPC
JDAM A/W/E
F-18 UPC

Lockheed Martin
H-60 UPC

BAE
MPS Core
TASM A/W/Es

NGIT
JMPS Version 1
JMPS Combat 1
B-1 A/W/E

Raytheon
V-22

Lockheed Martin
U-2 A/W/E

Global Atomics
Predator A/W/E

NGIS PRB
PGMPS
WCMD A/W/E
AGM-130 A/W/E
AGM-142 A/W/E
JASSM A/W/E*

BAE Systems
CLOAR
JMPS Combat 1*
F-117 A/W/E*
Predator A/W/E*
Global Hawk A/W/E*

Raytheon
JSOW A/W/E

Lockheed Martin
F-22 A/W/E

NG Ryan Aerospace
Global Hawk A/W/E

Lockheed Martin
F-16 Blk 40/50 A/W/E
JSF UPC

Tybrin
PFPS
JMPS Version 1*
JMPS Combat 1
HH-60 A/W/E

Lockheed Martin
JASSM A/W/E

GTRI
JMPS Version 1*
JMPS Combat 1*

* Subcontractor

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Questions ?

AMPS/JMPS-A Software Timeline

- AMPS version 5.2.1   November 2002
  - AH-64D software version 6
  - OH-58D Kiowa Warrior CDS 2 bug fixes
  - PFPS version 3.2
- PFPS-Army version 3.3 August 2003
  - New AMPS software built on PFPS baseline
  - Supports all Army Aviation airframes, including AH-64D sw v 6, 7
  - Will be fielded concurrently with hardware replacing AMPS LCU
- JMPS-Army version 1.0 April 2005
  - Joint Interoperability
  - Software Blocking Release

AMPS to JMPS-A Migration

AMPS

**LB SW V 1- 6
AH-64A Mod
KW (CDS 2, 3, 4)
UH-60A/L
CH-47D**

LB SW V 6
AH-64A Mod
KW (CDS 2, 3, 4)
UH-60A/L
CH-47D

AMPS

PFPS

UH-60A/L
CH-47D
AH-64A Mod

AMPS

PFPS-A

UH-60A/L
CH-47D
AH-64A Mod
LB SW V 6, 7/8
KW (CDS 2, 4)
UH-60Q

PFPS-A

UH-60A/L
CH-47D
AH-64A Mod
LB SW V 6, 7/8
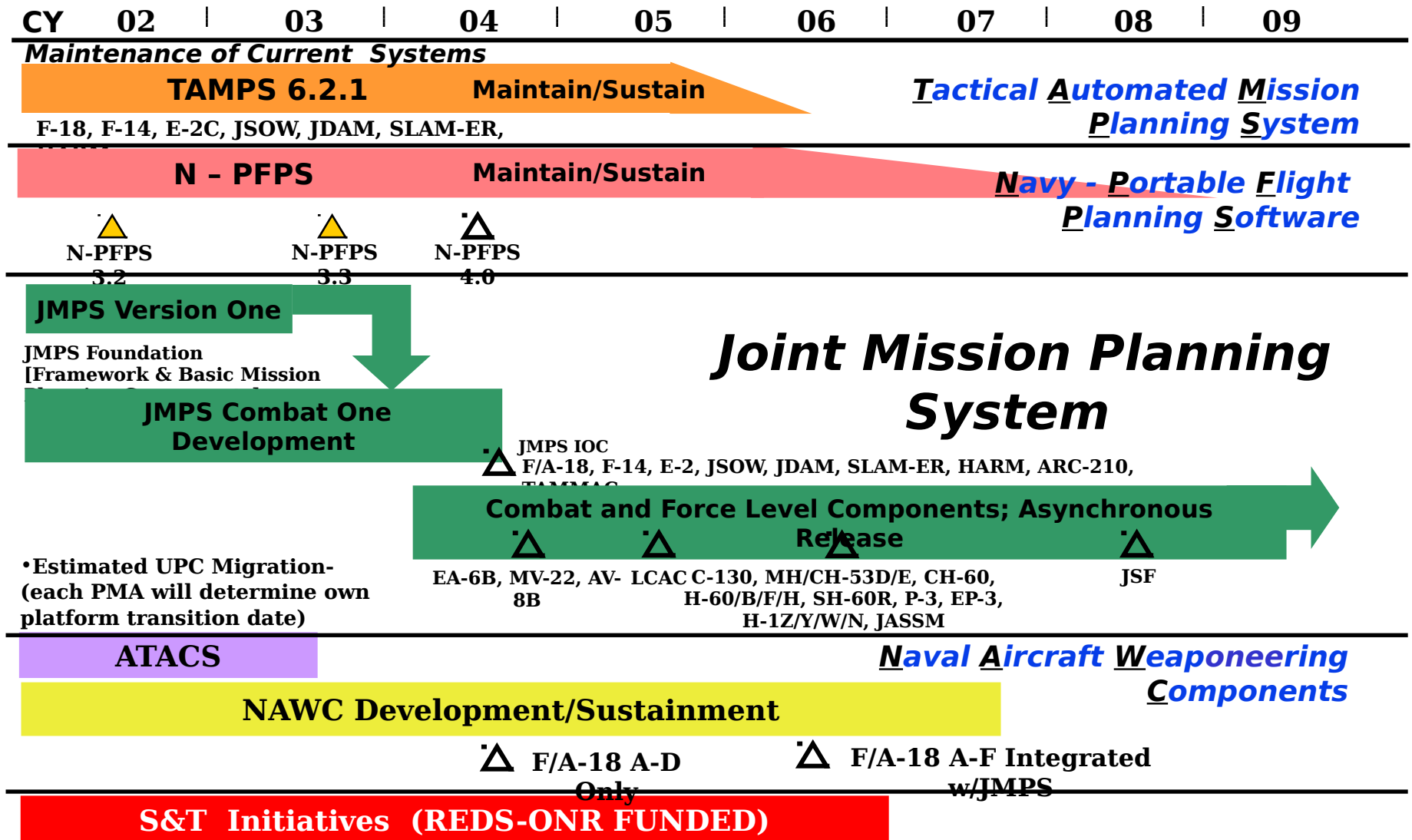KW (CDS 2, 4)
UH-60Q
LB SW V 6.1, 8.1

JMPS-A

**LB SW V 6.1, 10
AH-64A Mod
KW (CDS 2, 4)
UH-60A/L/M/Q
HH-60L/M
CH-47D/F
Comanche**

PFPS/JMPS

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Roadmap
- Planning for a Smooth Transition -

CY	02	03	04	05	06	07	08	09

Maintenance of Current Systems

TAMPS 6.2.1 — **Maintain/Sustain**

Tactical Automated Mission Planning System

F-18, F-14, E-2C, JSOW, JDAM, SLAM-ER, HARM

N – PFPS — **Maintain/Sustain**

Navy - Portable Flight Planning Software

△ **N-PFPS 3.2** △ **N-PFPS 3.3** △ **N-PFPS 4.0**

JMPS Version One

JMPS Foundation [Framework & Basic Mission Planning Components]

JMPS Combat One Development

Joint Mission Planning System

△ **JMPS IOC** F/A-18, F-14, E-2, JSOW, JDAM, SLAM-ER, HARM, ARC-210, TAMMAC

Combat and Force Level Components; Asynchronous Release

△ EA-6B, MV-22, AV-8B
△ LCAC
△ C-130, MH/CH-53D/E, CH-60, H-60/B/F/H, SH-60R, P-3, EP-3, H-1Z/Y/W/N, JASSM
△ JSF

•Estimated UPC Migration- (each PMA will determine own platform transition date)

ATACS

Naval Aircraft Weaponeering Components

NAWC Development/Sustainment

△ F/A-18 A-D Only
△ F/A-18 A-F Integrated w/JMPS

S&T Initiatives (REDS-ONR FUNDED)

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Why Automated Mission Planning

- Accuracy, not estimation, means improved safety of flight
  - Accurate Calculations Mean More Effective Mission
    - Airfield, Threat and Target Location Identified Accurately
    - Accurate Distance Measures
    - All Calculations are Error Checked
  - Reduced Risk of Equipment or Personnel Loss
- Accuracy Means More Economic Use of Resources
  - More Efficient Turn Around of Aircraft - Reduced Number of Sorties (Force Multiplier)
  - Fuel Efficiency - Route Planning
  - Reduce Loss of Life and Equipment
    - Threat Analysis, Mission Rehearsal

Why Automated Mission Planning

- Data Availability
  - System Admin keeps system data current
  - Pilots spend less time looking for maps, airfield data, computing and re-computing measures
  - Near Real Time updates of:
    - Air Tasking Orders
    - Air Coordination Orders
    - Threat Data
  - Unit preferences maintains consistency